

## **Quantile range-based volatility measure for modelling and forecasting volatility using high frequency data**

*Presenter:* Kok-Haur Ng, University of Malaya, Malaysia

*Co-authors:* Jennifer Chan, Shay-Kee Tan

Volatility of asset prices in financial market is not directly observable. Return-based models have been proposed to estimate the volatility using daily close price. Recently, many new range-based volatility measures were proposed to estimate the financial volatility. A quantile Parkinson (QPK) measure is proposed to estimate daily volatility. We show how the Parkinson (PK) measure can robustify in the presence of intraday extreme returns. Results from extensive simulation studies show that the QPK measure is more efficient than intraday (open-to-close) squared returns and PK measures in the presence of intraday extreme returns. To demonstrate the applicability of QPK measure, we analyse the daily Standard and Poor 500 indices by fitting the QPK measure to the conditional autoregressive range (CARR) models. Results shows that choosing a suitable quantile level for the QPK measure will reduce its variance and hence improve its efficiency. In addition, the QPK measure using asymmetric CARR model gives the best in-sample model fit based on Akaike information criterion and provides the best out-of-sample forecast based on root mean squared forecast error and other measures. Mincer Zarnowitz test is carried out to confirm the unbiasedness of the forecasted volatility. Different levels of value-at-risk and conditional value-at-risk forecasts are also provided.